VANAGAS, V.V.; GLEBOTSKIY, I.I.; USHPALIS, K.K. [Užpalis, K.]; YUTSIS, A.P., red.; YAKOVKIN, M.V., red.; POPOVA, N.S., tekhn.red.

[Tables of radial integrals of the theory of atomic spectra] Tablitsy radial'nykh integralov teorii atomnykh spektrov. Pod red. A.P.IUtsisa. Moskva, Vychislitel'nyi tsentr Akad. nauk SSSR, 1960. 380 p. (MIRA 14:4)
(Atomic theory--Tables, etc.)

YUTSIS, A.P. [Juocys, Adolfas]; DAGIS, R.S. [Dagys, R.]

Problem of the method of expressing dielectron matrix elements of the operators of a spin-dependent force. Liet ak darbai B no.1: 41-57 '60. (MEAI 9:10)

1. Institut fiziki i matematiki AN Litovskoy SSR i Vil'nyusskiy gos. universitet im. V.Kapsukasa.
(Nuclear spin) (Electrons) (Calculus of tensors)

YUTSIS, A.P. [Jucys, Adolfas]; DAGIS, R.S. [Dagys,R.]

Problem of correcting the theoretical determination of the structure of terms of boron, carbon, and nitron atoms. Liet ak darbai B no.1: 59-70 '60. (EEAI 9:10)

1. Institut fiziki i matematiki AN Litovskoy SSR i Vil'nyusskiy gos. pedagogicheskiy insitut.
(Boron) (Carbon) (Nitrogen) (Atoms)

S/269/63/000/003/011/036
A001/A101

AUTHORS: Yutsis, A., Vizbarayte, Ya.

TITLE: On specifying the calculation of forbidden spectral lines

PERIODICAL: Referativnyy zhurnal, Astronomiya, no. 3, 1963, 29 - 30, abstract 3.51.237 ("Byul. Astron. observ. Vil'nyussk. un-ta", 1960, no. 2, 3 - 6, Lithuanian and English summaries)

TEXT: The authors consider the question on specifying the calculations of transition probabilities for forbidden lines, conducted on assumption of LS-coupling. Attention is drawn to the fact that, in a number of cases, the initial and final states of the atom or the ion are characterized by different types of coupling. Then new selection rules appear for the electric quadrupole transition. By means of selecting a suitable coupling type in the initial and final states, more precise results can be achieved than by means of using the multi-configuration approximation.

A. Kolesov

[Abstracter's note: Complete translation]

Card 1/1

24,6520

S/020/60/135/004/011/037
B019/B077

AUTHOR: Vizbarayte, Ya. I., Eringis, K. K., and Yutsis, A. P., Academician of the AS Litovskaya SSR

TITLE: About the Extended Methods of Hartree-Fok

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol. 135, No. 4, pp. 809 - 810

TEXT: The authors outline the methods of Fok and Hartree in an extensive introduction, and discuss the determination of the wave function of the entire atom by using the extended methods of Hartree and Fok. It is noted that the equations of the extended methods of Hartree and Fok agree for the ground state of a helium-type atom. The application of this extended method is very complicated. In order to simplify calculation, the radial single-electron wave functions have to be determined by the extended method of Hartree (by solving the equations of the extended method of Hartree, or by finding the parameter of the analytical single-electron wave functions); all other calculations have to agree with the requirements of the extended method of Fok. The calculation of the $1s^2 2p^2$ configuration

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89018

About the Extended Methods of Hartree-Fok S/020/60/135/004/011/037
B019/B077

of the beryllium atom where single-electron wave functions similar to hydrogen are used is presented to demonstrate the application of that extended method. There are 1 table and 7 references: 3 Soviet, 1 German, 1 British, and 1 US.

ASSOCIATION: Institut fiziki i matematiki Akademii nauk LitSSR
(Institute of Physics and Mathematics, Academy of Sciences Litovskaya SSR)

SUBMITTED: August 22, 1960

Card 2/3

89018

S/020/60/135/004/011/037
B011/B077

	^1P	^1D	^1S
a	−1,451	−1,393	−1,306
б	−1,421	−1,355	−1,253
в	−1,430	−1,364	−1,276
г	−1,480	−1,509	−1,372

Legend to Table 1: The first row gives the energies of the np^2 shell in Rydberg units; these values were obtained by the method outlined above. The second row gives corresponding values obtained by the non-extended method. The third row gives values obtained from solutions of the ordinary Fok equations. The fourth row gives experimental results.

Card 3/3

86829

S/020/60/135/005/017/043
B019/B067

24.4500

AUTHORS: Vizbarayte, Ya. I., Chiplis, V. I., and Yutsis, A. P., Academician of the AS Litovskaya SSR

TITLE: Selection Rules of Electron Transition in Various Types of Coupling

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol. 135, No. 5, pp. 1101-1103

TEXT: The authors studied electrical single-electron multipole transitions with configuration $l^q l'$, where an LS coupling exists in the l^q shell. It is assumed that this shell is characterized by the quantum numbers $L_o S_o$, which together with the single-electron momenta l's' of various types of coupling give the momentum J. Besides the known LS and Jj couplings, the Jl and LS_o couplings introduced by Racah et al. (Ref. 1) and A.M. Gutman et al. (Ref. 2) are of importance. These couplings are characterized by the intermediate quantum numbers $T_1 T_2$. Thus, the state under consideration

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86829

Selection Rules of Electron Transition in Various Types of Coupling

S/020/60/135/005/017/043
B019/B067

is characterized by $nl^q\alpha_0 L_0 S_0 n'l' T_1 T_2 JM$. The transitions

$$S(nl^q\alpha_0 L_0 S_0 n'l' T_1 T_2 J,\ nl^q\alpha_0 L'_0 S'_0 n''l'' T'_1 T'_2 J') =$$

$$= |(\alpha_0 L_0 S_0 n'l' T_1 T_2 J \| T^{(k)} \| \alpha_0 L'_0 S'_0 n''l'' T'_1 T'_2 J')|^2 \qquad (1)$$

are studied, and the selection rules for the transition

$$l^q\alpha_0 L_0 S_0 l' T_1 T_2 J - l^q\alpha_0 L_0 S_0 l'' T'_1 T'_2 J'$$

are summarized in Table 1. These ten selection rules are divided into five groups the first two of which are known. The three other groups comprise new selection rules. According to these selection rules, transition may occur only if the corresponding quantum number and the quantum numbers of the other configurations form a triangle or quadrangle. Important consequences of these new selection rules are discussed. There are 1 table and 4 references: 2 Soviet and 2 US.

ASSOCIATION: Institut fiziki i matematiki Akademii nauk LitSSR (Institute of Physics and Mathematics of the Academy of Sciences Litovskaya SSR)

Card 2/3

86829

Selection Rules of Electron Transition in Various Types of Coupling

S/020/60/135/005/017/043
B019/B067

SUBMITTED: August 22, 1960

Правила отбора для перехода
$l^q a_0 L_0 S_0 l'' T_1 T_2 J - l^q a_0 L_0 S_0 l'' T_1' T_2' J'$

1	2	3	4	5
$LS-LS$	$J_l - J_l$	$LS - Jl$	$LS_0 - LS_0$	$Jl - Jl$
$LS - L'S'$	$J_0 l' - J_0' l''$	$LS - J_0 l''$	$LK - L'K'$	$J_0 K - J_0' K'$
$\{LL'k\}$ $\{SS'0\}$	$\{J_0 J_0' 0\}$ $\{l' l'' k\}$	$\{J_0 l' s' J\}$ $\{SL_0 l'' J'\}$ $\{L\}\{l''\}$	$\{LL'k\}$ $\{KK'k\}$	$\{KK'k\}$ $\{J_0 J_0' 0\}$
6	7	8	9	10
$LS - LS_0$	$LS - Jl$	$Jl - LS_0$	$LS_0 - Jl$	$Jl - Jl$
$LS - L'K$	$LS - J_0 K$	$J_0 K - LK'$	$LK - J_0 l''$	$J_0 K - J_0' l''$
$\{LL'k\}$ $\{SL'J'\}$ $\{K\}$	$\{LKS_0 k\}$ $\{J_0 l' s' J\}$ $\{SL_0 l'' J'\}$	$\{KK'k\}$ $\{J_0 l'' K'\}$ $\{L\}$	$\{J_0 l' K\}$ $\{L\}\{l''\}$	$\{J_0 J_0'' 0\}$ $\{K\}\{l''\}$

Card 3/3

S/020/60/135/006/011/037
B019/B056

AUTHORS: Vizbarayte, Ya. I., Strotskite, T. D., and Yutsis, A. P., Academician of the AS Litovskaya SSR

TITLE: Generalized Hartree-Fok Methods

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol. 135, No. 6, pp. 1358-1360

TEXT: That improvement of the quantum-mechanical calculation of an atom is called multiconfiguration approximation, in which the wave function of the entire atom is expressed in the form $\Psi = N\sum_i \lambda_i \Psi_i$ (1), where Ψ_i is the wave function of the whole atom, λ_i is a factor determined by the variational principle, and N denotes a normalization factor. If Fok's variational method is applied to (1), equations of the generalized Fok method of the selfconsistent field or Fok equations in multiconfiguration approximation will be obtained. The transition from the solutions of the

Card 1/2

Generalized Hartree-Fok Methods

S/020/60/135/006/011/037
B019/B056

Hartree equation to such of the Fok equation is already an improvement, a further being the transition from the solutions of the ordinary Fok equations to such of the generalized Fok equations. From studying publications dealing with the generalized Fok method, the authors come to the conclusion that the solutions of equations of the generalized Fok method depend only slightly on the type of coupling. The independence of the Hartree methods of the type of coupling is caused by the use of a wave function of the whole atom as a variation. The authors suggest using solutions of the generalized Hartree equations in second configuration approximation. There are 12 references: 10 Soviet and 2 British.

ASSOCIATION: Institut fiziki i matematiki Akademii nauk LitSSR (Institute of Physics and Mathematics of the Academy of Sciences Litovskaya SSR)

SUBMITTED: November 1, 1960

Card 2/2

YUTSYS, A

MATULIS, J., red.; ZIUGZDA, J., red.; JUCYS, A., red.; LASAS, V., red.; KORSAKAS, K., red.; PETRAUSKAS, V., red.; ISKAUSKAS, J., red.; FRIDAITE, L., red.; SARKA, S., tekhn. red.

[Science in Soviet Lithuania] Mokslas Tarybu Lietuvoje. Vilnius, Valstybine politines ir mokslines literaturos leidykla, 1961. 334 p. (MIRA 15:3)

1. Lietuvos TSR Mokslu akademija, Vilna.
(Lithuania—Science)

L 17992-63 EWT(1)/FCC(w)/BDS AFFTC/ASD/IJP(C)

ACCESSION NR: AT3002102 S/2910/61/001/0[illegible]/0021/0032

AUTHORS: Vizbarayte, Ya. I.; Rudzikas, Z. B.; Budrite, S. D.; Matis, A. P.

TITLE: Contribution to the calculation of strength of the lines and of the selection rule for various types of vector coupling

SOURCE: AN LitSSR. Litovskiy fizicheskiy sbornik. v.1, no.1-2, 1961, 21-32

TOPIC TAGS: vector coupling, electric multipole radiation operator, multipole interaction, dipole transition, multipole transition, selection rule, j-coefficient, experimental spectroscopy, astrophysics

ABSTRACT: This theoretical paper develops expressions for the matrix elements of the operator of an electric multipole for the configurations: $l_1^{N_1} l_2 - l_1^{N_1} l_3$, $l_1^{N_1} l_2 - l_1^{N_1-1} l_2^2$, $l_1^{N_1} l_2 - l_1^{N_1-1} l_2^{N_2+1}$, and $l_1^{N_1} l_2 - l_1^{N_1+1} l_2^{N_2-1}$ for various types of vector coupling. Consideration is also given to those [illegible] which different types of coupling obtain in the initial and final configu- [illegible] cases are established. They are

expressed by ... of the l-coefficients ...
condition of nonvanishing ...

Card 1/2

L 17992-63
ACCESSION NR: AT3002102

the matrix elements of the electric multipole radiation operator. The primary purpose of this paper is the study of transitions having a probability which is determined by highly complicated l-coefficients, a problem which leads to more complicated selection rules than have been investigated heretofore. Orig. art. has 34 numbered equations and formulas, and 3 tables.

ASSOCIATION: Institut fiziki i matematiki Akademii nauk Litovskoy SSR (Institute of Physics and Mathematics, Academy of Sciences, LithSSR); Vil'nyusskiy

SUBMITTED: 13May61 DATE ACQ: 23Apr63 ENCL: 00

SUB CODE: AS, MM, PH NO REF SOV: 010 OTHER: 002

Card 2/2

S/081/61/000/021/004/094
B102/B138

AUTHORS: Vizbarayte, Ya. I., Vosilyus, I. I., Savukinas, A. Yu., Yutsis, A. P.

TITLE: Two-electron matrix elements of the energy operator in the case of jl-coupling

PERIODICAL: Referativnyy zhurnal. Khimiya, no. 21, 1961, 12, abstract 21B84 (Tr. AN LitSSR, B, v. 1(24), 1961, 23 - 42)

TEXT: The matrix elements were determined for the matrices of jl-coupling transformations to LS and jj-coupling, expressed by 6j-coefficients, and also expressions for the electrostatic and spin-orbit interaction energy. The coefficients at the radial integrals in the expressions of these energies are tabulated for the configurations sl, pp, pd, pf, pg, dd, df and dg. [Abstracter's note: Complete translation.]

Card 1/1

L 13026-63 EDS
ACCESSION NR AT3002103 S/2910/61/001/01 /0033/003

AUTHOR: ... S. A., ... Ya. I., ... ucys, A. P.

TITLE: Contribution to the problem of types of vector coupling in a p^2l configuration

SOURCE: ... SSR. ... sbornik, v.1, no.1-2, 1961, 33-...

TOPIC TAGS: vector coupling, configuration p..., matrix elements, energy operator, spin-orbit interaction, electrostatic interaction, O, N, oxygen energy level, nitrogen energy level

ABSTRACT: This theoretical paper is a further development of a paper by the same authors in Akad. nauk LitSSR, Trudy, B, v. 2(25), 1961, 53, in which an ... of the problem of the types of vector coupling for a configuration ... the regularities prevailing in the change of type of coupling following an increase in the degree of excitation. The

L 18020-63
ACCESSION NR: AT3002103

examined in the case of O II and N I atoms with reference to the configuration $1s^2 2s^2 2p^2 4f$. The arrangement of the energy levels is compared for the experimental and for the LS_0 and the $J_0 l$ theoretical cases. A comparison of the experimental and theoretical data in the case of O II permits the conclusion that the LS_0 and $J_0 l$ couplings are equally suitable in the $2p^2 4f$ configuration. In the transition to N I the LS coupling is not suitable. It is possible that with the increase in Z the transition to nonhomogeneous coupling occurs at lower degrees of excitation. Orig. art. has 4 formulas and 2 figures.

ASSOCIATION: Institut fiziki i matematiki Akademii nauk Litovskoy SSR (Institute of physics and mathematics, Academy of Sciences, LithSSR)

SUBMITTED: 16May61 DATE ACQ: 23Apr63 ENCL: 00

SUB CODE: PH, MM, EI NO REF SOV: 005 OTHER: 001

S/081/61/000/021/003/094
B102/B138

AUTHORS: Vizbarayte, Ya. I., Vosilyus, I. I., Savukinas, A. Yu., Yutsis, A. P.

TITLE: Application of jl-coupling in the case of an excited oxygen ion

PERIODICAL: Referativnyy zhurnal. Khimiya, no. 21, 1961, 12, abstract 21B83 (Tr. AN LitSSR, B, v. 1(24), 1961, 43 - 48)

TEXT: The energy spectrum of a $1s^2 2s^2 2pnl$ configuration is examined using jl-coupling. In the case nl = 4f,5g, theoretical values for the positive oxygen ion energy were found and compared with experimental data. [Abstracter's note: Complete translation.]

Inst. Physics + Math.
AS. Lith SSR

Card 1/1

S/081/61/000/021/005/094
B102/B138

AUTHORS: Zhvironayte, S. A., Vizbarayte, Ya. I., Yutsis, A. P.

TITLE: Two-electron matrix elements of the energy operator in the case of Ls-coupling

PERIODICAL: Referativnyy zhurnal. Khimiya, no. 21, 1961, 12, abstract 21B85 (Tr. AN LitSSR, B, v. 1(24), 1961, 49 - 64)

TEXT: A mathematical procedure is shown, for the calculation of two-electron systems in the case of Ls-coupling. The coefficients of the radial integrals in the expressions of the matrix elements of the energy operator are given numerically for spin-orbital as well as for electrostatic interactions for sl, pp, pd, pf, pg, dd, df and dg configurations. [Abstracter's note: Complete translation.]

Card 1/1

33654
S/058/61/000/012/007/083
A058/A101

24.4400

AUTHORS: Yutsis, A.P., Vizbarayte, Ya.I.

TITLE: Concerning the use of coupling-independent Fok equations

PERIODICAL: Referativnyy zhurnal. Fizika, no. 12, 1961, 27, abstract 12A389 (LietTSR Mokslu Akad. darbai, Tr. AN LitSSR, 1961, B 1 (24), 65-73, Lith. summary)

TEXT: It is noted that attempts to replace the exchange terms in the Fok equations of the self-consistent field by simpler expressions have failed because they yield a revaluation of the exchange effect that is difficult to check. It is suggested that the Fok equations be simplified by neglecting the terms that yield a dependence on the type of coupling of momenta. Such Fok equations yield results a little inferior to those obtained with the aid of the complete Fok equations, but it is much simpler to solve them and use the solutions in practice. Neglecting exchange terms in coupling-independent Fok equations leads to more accurate equations than the Hartree equations. It is pointed out how ex-

X

Card 1/2

33654
S/058/61/000/012/007/083
A058/A101

Concerning the use ...

pedient it is to use such refined Hartree equations in those cases where one can confine oneself to one-electron wave functions less rigorous than the solutions of the Fok equations.

[Abstracter's note: Complete translation]

Card 2/2

X

30631
S/081/61/000/020/004/089
B119/B147

24.6110

AUTHORS: Dagis, R. S., Yutsis, A. P.

TITLE: Elucidation of the reversal of doublet-terms for the case of the copper atom

PERIODICAL: Referativnyy zhurnal. Khimiya, no. 20, 1961, 8 - 9, abstract 20B54 (Tr. AN LitSSR, B, 1(24), 1961, 105 - 112)

TEXT: An attempt was made to calculate the reversal of the Cu doublet by means of the multiconfigurational approximation method (mixing of configurations). The following systems were calculated: $3d^{10}(^1S)nl^2L - 3d^9 4s(^1D)4p^2L - 3d^9$, $4s4p(^1P)^2L$, where n, l = 4f, 6p and L = P, F. The wave functions of the corrective configurations were obtained in single-electron approximation. Their weight coefficients were calculated from the wave function of the system using the experimental energy levels. The qualitative results lead to reverse doublets, unlike the single-configuration approximation, whereas the quantitative results (-1 and -45 cm^{-1}) differ strongly from the experimental: -3.5 and -244cm^{-1}.

Card 1/2

Elucidation of the...

The authors consider that these differences are essentially due to (1) the neglect of other possible linkages (except LS), and (2) the calculation of the wave function of corrective configurations by the single-configuration approximation method. As is shown by calculations, the order of the addition of shell moments and the selection of the intermediate term are important for the case of the third and of the less complete shells. The authors conclude, that the characteristics of the experimental levels are revised on the basis of multiconfigurational approximation. [Abstracter's note: Complete translation.]

Card 2/2

DAGIS, R. S.[Dagys, R.]; YUTSIS, A. P.[Jucys, A.]

Concerning the method of the addition of moments in excited configurations Ti I and Ti II. Liet ak darbai B no.1:113-116 '61. (EEAI 10:9)

1. Institut fiziki i matematiki Akademii nauk Litovskoy SSR i Vil'nyusskiy gosudarstvennyy universitet im. V. Kapsukasa.

(Titanium) (Atomic energy)

3 138

24,4400

S/058/62/000/004/010/160
A058/A101

AUTHORS: Yutsis, A. P., Vizbarayte, Ya. I.

TITLE: On the forms of equations of the self-consistent field

PERIODICAL: Referativnyy zhurnal, Fizika, no. 4,1962, 25, abstract 4A193 ("LietTSR Mokslų Akad. darbai, Tr. AN LitSSR", 1961, B3 (26) 11 - 17, Lith. summary)

TEXT: It is pointed out that neglect of exchange terms between shells in the Fok equations leads to equations which in the general case differ essentially from the Hartree equations. On the other hand, utilization of the wave function of the whole atom in the form of a unique product of one-electron wave functions is ambiguous. It is shown that the Hartree equations can be derived unambiguously by using the wave function of the whole atom in the form of a product of radial wave functions. The ambiguity in the "unlimited" Hartree-Fok method is indicated, an ambiguity consisting in the selection of a unique determinant through which the wave function of the whole atom is expressed.

[Abstracter's note: Complete translation]

Card 1/1

S/058/62/000/005/036/119
A001/A101

AUTHORS: Vizbarayte, Ya. I., Strotskite, T. D., Yutsis, A. P.

TITLE: On devising the generalized Hartree method'

PERIODICAL: Referativnyy zhurnal, Fizika, no. 5, 1962, 2, abstract 5V9 ("Tr. AN LitSSR", 1961, v. B3(26), 19-26, Lithuan. summary)

TEXT: It is shown that single-electron wave functions of individual configurations in a multi-configuration approximation depend slightly on terms of a given configuration and also on the coupling type. The generalized Hartree method is compared with the generalized method of self-consistent field by Fok, which consists in its generalization to the multi-configuration approximation. The generalized Hartree method consists in the following procedure: In determining single-electron wave functions, a linear combination of products of radial single-electron wave functions is used as variation wave function, and all other calculations are carried out according to Fok's generalized method. The employment of the proposed method for the case of He atom yielded practically the same results as the complete generalized Fok method.
[Abstracter's note: Complete translation]

Card 1/1

STEPONAVICHYUTE, A. V.[Steponaviciute, A.]; VIZBARAITE, Ya. I.[Vizbaraite, J.]; YUTSIS, A. P.[Jucys, A.], akademik

Transformation matrix of a three-electron wave function between LS and Jl couplings. Liet ak darbai no.3:41-52 '61.

1. Institut fiziki i matematiki Akademii nauk Litovskoy SSR i Vil'nyusskiy gosudarstvennyy universitet im. V. Kapsukasa.

24.6300

S/058/62/000/006/019/135
A061/A101

AUTHORS: Yutsis, A. P., Dagis, R. S., Vizbarayte, Ya. I., Zhvironayte, S. A.

TITLE: A more accurate definition of expressions for the matrix elements of spin-interaction operators

PERIODICAL: Referativnyy zhurnal, Fizika, no. 6, 1962, 1, abstract 6V2 ("Tr. AN LitSSR", 1961, v. B3(26), 53 - 66, Lith. summary)

TEXT: Expressions have been obtained for radial integrals indicating the energy of spin-spin (magnetic) interaction of electrons in the atom. Their characteristics of these integrals are established, and the inaccuracy of expressions for two-electron matrix elements of spin interaction, obtained earlier (Marvin, H. H. "Phys. Rev.", 1947, v. 71, 102; RZhFiz, 1960, no. 9, 22881) is pointed out. Tables compiled with appropriate calculations convey the corrections to be introduced in the papers mentioned above.

[Abstracter's note: Complete translation]

Card 1/1

24.6200

S/058/62/000/006/021/136
A061/A101

AUTHORS: Yutsis, A. P., Vizbarayte, Ya. I., Eringis, K. K.

TITLE: The use of an expanded calculation method for spectral line intensity determination

PERIODICAL: Referativnyy zhurnal, Fizika, no. 6, 1962, 2, abstract 6V13 ("Tr. AN LitSSR", 1961, v. B3(26), 99 - 105, Lith. summary)

TEXT: Operators of electric dipole and quadrupole transitions are presented in the form of irreducible tensor operators which, in the case of a quadrupole, differ by a constant factor from the corresponding operator used in other studies. Relations are found which allow the passage from the conventional calculation method to the expanded method in determining the line intensity in configurations of two equivalent electrons. Numerical values of line intensities are given for $1s^2 - 1s2p$, $2p^2 - 1s2p$, $1s^2 2p^2 - 1s^2 2s2p$ dipole transitions in a number of atoms and ions, and also for the $2p^2 - 2p^2$ quadrupole transition in the carbon atom.

[Abstracter's note: Complete translation]

Card 1/1

S/058/62/000/005/038/119
A001/A101

AUTHORS: Eringis, K. K., Vizbarayte, Ya. I., Yutsis, A. P.

TITLE: A study of the problem of using the wave function of a whole atom, consisting of radial single-electron wave functions

PERIODICAL: Referativnyy zhurnal, Fizika, no. 5, 1962, 2, abstract 5V12 ("Tr. AN LitSSR", 1961, v. B3 (26), 67-80, Lithuan. summary)

TEXT: The problem of symmetrization of a product of radial wave functions is studied. A method is proposed of using various radial wave functions in one and the same electron shell. The corresponding method of calculations constitutes the Fok generalized method. This method is compared with the Hartree generalized method. It is proposed to determine radial wave functions by the Hartree generalized method and all the other calculations to carry out according to requirements of the theory of Fok's generalized method. This permits avoiding complicated calculations on determining single-electron functions and makes the method practicable. Calculations are carried out for the $1s^2 2p^2$ configuration of Be atom by means of analytical single-electron wave functions. The results

Card 1/2

24.4400

S/058/62/000/004/009/160
A058/A101

AUTHORS: Yutsis, A. P., Shugurov, V. K., Vizbarayte, Ya. I., Kringis, K. K.

TITLE: Concerning the calculation of matrix operator elements in an expanded calculation method

PERIODICAL: Referativnyy zhurnal, Fizika, no. 4, 1962, 25, abstract 4A192 ("LietTSR Mokslų Akad. darbai, Tr. AN LitSSR", 1961, B3 (26), 81 - 92, Lith. summary)

TEXT: For expressing matrix operator elements of atomic quantities in the case of an expanded calculation method, there was used the wave function of the whole atom expressed with the aid of a geneological coefficient. Expressions were found for which one- and two-electron submatrix elements must be substituted in the formulae of the conventional (unexpanded) calculation method in order to derive expressions for matrix operator elements in the expanded calculation method. At the same time, the rest of the operation of calculations on expressing matrix elements through radial integrals is the same as in the conventional calculation method.
[Abstracter's note: Complete translation]

Card 1/1

S/058/62/000/005/039/119
A001/A101

AUTHORS: Eringis, K. K., Vizbarayte, Ya. I., Yutsis, A. P.

TITLE: On refining the calculation of fine structure of terms in atoms with two 2p electrons

PERIODICAL: Referativnyy zhurnal, Fizika, no. 5, 1962, 2, abstract 5V13 ("Tr. AN LitSSR", 1961, v. B3 (26), 93-98, Lithuan. summary)

TEXT: The authors determine a correction to the fine structure of iso-electronic rows of atoms in configurations $2p^2$ and $1s^2p^2$, as well as to the ground configuration of the C atom. The results obtained show that the generalized calculation method increases magnitude of splitting of the ^3P term and thus brings it nearer to experimental data.

[Abstracter's note: Complete translation]

Card 1/1

YUTSIS, A. P.[Jucys, A.], akademik; VIZBARAYTE, Ya. I.[Vizbaraitė, J.]; ERINGIS, K. K.[Eringis, K.]

Application of the extended calculation method for determining the intensity of spectral lines. Liet ak darbai no.3:99-105 '61.

1. Vil'nyusskiy gosudarstvennyy universitet im. V. Kapsukasa i Institut fiziki i matematiki Akademii nauk Litovskoy SSR.

S/058/62/000/005/037/119
A001/A101

AUTHORS: Vizbarayte, Ya. I., Yutsis, A. P.

TITLE: Transitions between different levels of one and the same configuration at different coupling types

PERIODICAL: Referativnyy zhurnal, Fizika, no. 5, 1962, 2, abstract 5V11 ("Tr. AN LitSSR", 1961, v. B3(26), 125-131, Lithuan., summary)

TEXT: Expressions are presented for the total strength of a magnetic dipole for the case of two optical electrons. A method is indicated to obtain corresponding formulae for an electric quadrupole transition without changing single-electron orbital quantum numbers. Using these formulae, selection rules are established for transitions between individual levels of one and the same configuration. Results show that forbidden lines at one coupling may be allowed ones at another one. Examples of such cases are cited. It is pointed out that theoretically determined intensities of allowed transitions strongly depend on the type of coupling.

[Abstracter's note: Complete translation]

Card 1/1

S/044/62/000/007/045/100
C111/C222

AUTHORS: Yutsis, A.P., Vizbarayk, Ya,I.

TITLE: The mathematical problem of multiconfigurational approximation

PERIODICAL: Referativnyy zhurnal, Matematika, no. 7, 1962, 74, abstract 7B360. ("Liet TSR Mokslų Akad. darbai", 1961, B 3(26), 3 - 10)

TEXT: The method formulated in the title is a modification of the quantum-mechanical minimum principle due to Ritz : The energy of the basic state (simplest case) is estimated as the minimum of the functional

$$E = \int \phi^* H \phi \, dx / \int \phi^* \phi \, dx .$$

Here H -- Hamilton operator, $\phi = \sum \lambda_i \Phi_i$ -- the trial function, λ_i -- variation parameters, Φ_i -- a certain set of functions (e.g. anti-symmetric products of one-electron functions as in the method of Fok). The generalization consists in using as Φ_i functions which are determined by variational methods. The arising new minimization conditions are

Card 1/2

The mathematical problem of ... S/044/62/000/007/045/100
C111/C222

solved together with the preceding ones. This operation can be repeated. It is understood that the solution of these very extensive tasks is done with the aid of computing machines.

[Abstracter's note : Complete translation.]

Card 2/2

S/044/62/000/007/046/100
C111/C222

AUTHORS: Yutsis, A.P., Vizbarayte, Ya.I.

TITLE: On the forms of the equations of the self-co-ordinated field

PERIODICAL: Referativnyy zhurnal, Matematika, no. 7, 1962, 74, abstract 7B361. ("Liet TSR Mokslų Akad. darbai", 1961, B3(26), 11-17)

TEXT: Considered are questions concerning the connection between the equations of the Fok type and of the Hartry type in the calculation of the energy states of an atom.

[Abstracter's note : Complete translation.]

Card 1/1

S/058/62/000/007/004/068
A061/A101

AUTHORS: Yutsis, A. P., Vizbarayte, Ya. I.

TITLE: Mode of calculating the matrix elements of operators of atomic quantities in the case of complex configurations

PERIODICAL: Referativnyy zhurnal, Fizika, no. 7, 1962, 18, abstract 7A172 ("Tr. AN LitSSR", 1961, v. B, 4(27), 45 - 57; Lith. summary)

TEXT: A mode of expressing the matrix elements of operators of atomic quantities through two-electron submatrix elements is offered for the case of an arbitrary number of unfilled electron shells. The wave function of the whole atom is conveyed in the form of an antisymmetrized wave function of the individual shells which are linked to one another by the vectorial summation of the moments of momentum. The symmetry of the operators and the antisymmetry of the wave functions of the individual shells make it possible to express the matrix elements of the operators directly with the aid of simple fractional parentage coefficients. As a result, the method suggested is simpler than the formalism that uses the so-called complex fractional parentage coefficients.

[Abstracter's note: Complete translation]

Card 1/1

S/058/62/000/007/005/058
A061/A101

AUTHORS: Yutsis, A. P., Vizbarayte, Ya. I., Zhvironayte, S. A.

TITLE: Calculating the matrix elements of the energy operator in the case of one electron outside of an unfilled shell and for different types of coupling

PERIODICAL: Referativnyy zhurnal, Fizika, no. 7, 1962, 18, abstract 7A173 ("Tr. AN LitSSR", 1961, v. B, 4 (27), 59 - 72; Lith. summary)

TEXT: It is assumed that L-S coupling takes place in an unfilled shell, and that the resulting moments of this shell add vectorially to the moments of the outer electron in different types of coupling. The wave function is expressed by a linear combination of functions of the coupled moments. Expressions are given for the transformation matrices allowing for both the transition from the L-S coupling to other types and the coordinates interchange. Formulas are obtained for the matrix elements of electrostatic and spin-orbital interaction operators in different types of coupling.

[Abstracter's note: Complete translation]

Card 1/1

S/236/62/000/001/001/007
D234/D308

AUTHORS: Zhvironaytc, S.A., Vizbarayte, Ya.I. and Yutsis, A.P.

TITLE: Calculation of matrix elements of the energy operator in the case of a single electron outside a partially filled shell

SOURCE: Akademiya nauk Litovskoy SSR. Trudy. Seriya B, no. 1(28), 1962, 3-15

TEXT: The authors refer to their previous paper (Trudy AN Litovskoy SSR, B 4(27), 59, 1961) where general expressions were derived for the matrix element of a single electron outside a shell. If the shell is almost completely filled, these expressions can be simplified by making use of the properties of the operators of complementary shells (the configuration l^{4l+2-N} and l^N). The operator of electrostatic interaction energy is discussed and general expressions are obtained for the coefficients of radial integrals of electrostatic interaction of exchange type, for the four kinds of coupling LS, J_0l, LS_0 and J_0j. These coefficients are computed for a

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Calculation of matrix elements ... S/236/62/000/001/001/007
D234/D308

p^4l configuration with LS_o coupling. Energy levels of Ne II in the $1s^22s^22p^44f$ configuration, computed by the authors for J_ol and LS_o coupling, are compared in a diagram with the experimental levels. It is concluded that the J_ol coupling can be used for classification of the levels, while the LS_o coupling is useless. There are 1 figure and 1 table.

ASSOCIATION: Institut fiziki i matematiki Akademii nauk Litovskoy SSR (Institute of Physics and Mathematics, AS Lith-SSR), Vil'nyusskiy gosudarstvennyy universitet im. V. Kapsukasa (Vilna State University im. V. Kapsukas)

SUBMITTED: July 6, 1961

Card 2/2

44924

S/236/62/000/003/001/004
D234/D308

24.4400

AUTHORS: Bandzaytis, A.A., Vizbarayte, Ya.I. and Yutsis, A.P.

TITLE: Standard transformation matrices of the method of connecting seven tensor sets

SOURCE: Akademiya nauk Litovskoy SSR. Trudy, Seriya B, no. 3, 1962, 3 - 18

TEXT: The authors refer to their previous papers where a method of graphical representation of sums of products of Clebsch-Gordan coefficients was proposed. In the present paper they give diagrams of the standard matrices and their expressions in terms of 3(n-1) j-coefficients of the first and second kind, for any number of tensor sets. For the case of 7 sets they give diagrams and expressions of matrices in terms of 18 j-coefficients of types C,D,E,F,G,H,I,K,L,M,N,P,R,S,T,V. In order to express any transformation matrix in terms of the 18 j-coefficient one must reduce it to the standard form: this

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Standard transformation ...

process can be simplified in practice by taking into account the phase factor only, adding other factors later to the final matrix: full reduction is also unnecessary. A new definition of the 18 j-coefficient is given:

$$\begin{Bmatrix} j_1 & j_2 & j_3 & l_1 & l_2 & l_3 \\ l_1 & l_2 & l_3 & j_1 & j_2 & j_3 \\ k_1 & k_2 & k_3 & k_4 & k_5 & k_6 \end{Bmatrix} = (-1)^{j_1+j_2+j_3+l_1+l_2+l_3} \begin{Bmatrix} l_1 & l_2 & k_3 & k_4 & l_5 & l_6 \\ l_4 & k_5 & l_3 & l_5 & k_2 & l_2 \\ l_5 & k_6 & l_6 & l_4 & k_1 & l_1 \end{Bmatrix}. \quad (5.1)$$

There are 20 figures.

ASSOCIATION: Institut fiziki i matematiki AN Litovskoy SSR (Institute of Physics and Mathematics, AS Lithuanian SSR), Vil'nyusskiy gosudarstvennyy

Card 2/3

universitet im. V. Kapsukasa (Vilnyus University im. V. Kapsukas)

SUBMITTED: January 25, 1962

Card 3/3

S/236/62/000/004/001/009
D234/D308

AUTHORS: Rudzikas, Z. B., Vizbarayte, Ya. I, Bandzaytis, A. A. and Yutsis, A. P.

TITLE: Matrix elements of operators consisting of unit tensor operators

SOURCE: Akademiya nauk Litovskoy SSR. Trudy. Seriya B. no. 4, 1962, 3-22

TEXT: The authors review the expressions for unit tensor operators given in previous papers by themselves and by other authors, and give an extensive table of sub-matrix elements of the operators U^3, U^4, V^{31}, V^{41} for 2, 3, 4, 5d electrons. There is 1 table.

ASSOCIATION: Vil'nyusskiy gosudarstvennyy universitet im. V. Kapsukasa (Vil'nyus State University imeni V. Kapsukas); Institut fiziki i matematiki AN Litovskoy SSR (Institute of Physics and Mathematics AS Lithuanian SSR)

SUBMITTED: March 20, 1962

Card 1/1

14.3400

35805

S/051/62/012/002/001/020
E032/E514

AUTHORS: Yutsis, A.P., Vizbarayte, Ya. I., Strotskite, T.D. and Bandzaytis, A.A.

TITLE: On the multi-configurational approximation and its convergence

PERIODICAL: Optika i spektroskopiya, v.12, no.2, 1962, 157-162

TEXT: The mathematical basis of the multi-configurational approximation is the generalised Ritz method in which both the coefficients of the basic functions and the functions themselves are varied at the same time. The basic functions determined in this way ensure the rapid convergence of the method. Any departure from such functions reduces the degree of convergence. The present authors show that the sum of the energy corrections obtained by separate 2-configurational approximations in the case of helium-type atoms is equal to the total correction, provided the equivalent electron configurations are used as the correction configurations. In the case of beryllium-type atoms the sum of the corrections for separate shells gives the correction for the entire atom on the multi-configurational

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approximation. Approximate calculations for helium- and beryllium-type atoms showed that the multi-configurational approximation based on the generalised Ritz method gives rapid convergence of the wave functions and of the energy to the eigenfunctions and the eigenvalues of the Schrödinger equation. The possibilities of the method are indicated by Table 1 which gives the energies for helium-type atoms (in atomic units).

Table 1

	H^-	He	Li^+	Be^{++}
a	-0.489	-2.862	-7.236	-13.611
b	-0.526	-2.903	-7.278	-13.653
c	-	-2.904	-7.280	-13.657

In this table the first line refers to the self-consistent field method and the one-configurational approximation, the second line includes the correction for the multi-configurational approximation, and the third line gives the experimental results. There are 8 tables.

SUBMITTED: February 4, 1961

Card 2/2

YUTSIS, A.P.

JUCYS, A.P.

Present state and immediate tasks of quantum mechanical calculations on atoms. Magy fiz folyoir 11 no.4:305-323 '63.

1. Vilniusi V. Kapszukasz Allami Egyetem, a Litvan SZSZK Tudomanyos Akademia Fizikai es Matematikai Intezete.

L 12622-63 BDS/EWT(1) AFFTC/ASD/ESD-3 GG/IJP(C)
ACCESSION NR: AP3000262 S/0020/63/150/001/0062/0063

AUTHOR: Kharadze, Ye. [illegible]; Yutsis, A. P. Academician, AN SSSR

TITLE: The theory of restricted nebular lines corresponding to magnetic multifield [illegible]

SOURCE: AN SSSR. Doklady, v. 150, no. 1, 1963, 62-63

[illegible]

ASSOCIATION: Institut fiziki i matematiki Akademii nauk Litovskoy SSR (Institute of

Card 1/2

YUTSIS, A.P. [Jucys, A.]; ZHUKAUSKAS, K.P. [Zukauskas, K.]

Generalization of the recurrent relations between Clebsch-Gordan coefficients. Trudy AN Lit. SSR. Ser. B no.2:3-8 '63. (MIRA 17:10)

1. Institut fiziki i matematiki AN Litovskoy SSR i Vil'nyusskiy gosudarstvennyy universitet.

ACCESSION NR: AT4041503 S/2910/63/003/01-/0159/0166

AUTHOR: Dagis, R. S., Rudzikas, Z. B., Vizbarayte, Ya. I., Yutsis, A. P.

TITLE: Effect of orbit-orbit interaction in the case of equivalent electrons

SOURCE: AN LitSSR. Litovskiy fizicheskiy sbornik, v. 3, no. 1-2, 1963. 159-166

TOPIC TAGS: orbit-orbit interaction, equivalent electron, electron configuration, electron shell, radial integral, iron, electron energy

ABSTRACT: The orbit-orbit interaction affects the center of gravity of various terms of any given electron configuration and can be significant when the terms are close to each other. The popular correction schemes based on empirical data tend to give results which are too high. In the present article the exact expressions for the matrix elements of the orbit-orbit interaction energy operator for equivalent electrons are computed. Supplementary shell properties are used for partially filled shells. The method is based on evaluation of appropriate radial integrals, M^k, which appear in the orbit-orbit interaction operator. A table of coefficients for the radial integrals M^0 and M^2 in the diagonal matrix elements of the orbit-orbit energy interaction operator is generated for partially filled shells of p- and d-equivalent electrons. The table covers the values ^1S to ^1D for p^2,

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ACCESSION NR: AT4041508

^4S to ^2P for p^3, ^1S to ^1G for d^2, ^2P to ^2H for d^3, ^1S to ^4I for d^4 and ^2S to ^2I for d^5.

It is shown that the orbit-orbit interaction effect does not disappear when the shell is completely filled or when only one electron is missing. The radial integrals M^0(3d, 3d) and M^2 (3d, 3d) for Ti, V, Cr, Mn, Fe, Co, Ni and Cu are computed. This data is used to show that in a positive Mn ion the difference in levels a^3P_1 and a^3H_5 in cm^{-1} is one order of magnitude smaller than the orbit-orbit interaction. The example of the double Cu ion in $3d^9$ configuration shows that neglecting the orbit-orbit interaction can result in a term ration which is 30% too high. It is concluded that orbit-orbit interaction must be accounted for in accurate theoretical computations of energy levels. This is especially important when the absorption or emission of radiation is due to a transition between two closely spaced levels. "The authors express their gratitude to R. Petrushkyavichyus for his assistance in the computation of radial integrals." Orig. art. has: 18 equations and 2 tables.

ASSOCIATION: Vil'nyusskiy gosudarstvenny*y pedagogicheskiy institut (Vilnius State Pedagogical Institute); Vil'nyusskiy gosudarstvenny*y universitet im. V. Kapsukasa (Vilnius State University); Institut fiziki i matematiki Akademii nauk Litovskoy SSR (Institute of Physics and Mathematics, Academy of Sciences of the Lithuanian SSR)

Card

ACCESSION NR: AT4041508

SUBMITTED: 00 ENCL: 00

SUB CODE: NP NO REF SOV: 005 OTHER: 010

Card 3/3

ACCESSION NR: AP4012963 S/0020/64/154/004/0812/0814

AUTHORS: Bandzaytis, A.A.; Karosene, A.V.; Savukinas, A.Yu.; Yutsis, A.P. (Academician)

TITLE: Magnitudes of angular momentum with negative parameters representing the angular momentum quantum numbers.

SOURCE: AN SSSR. Doklady#, v.154, no.4, 1964, 812-814

TOPIC TAGS: angular momentum, negative parameter, quantum number, quantum mechanics, mathematical physics, Klebsch-Gordan coefficient, tensorial set

ABSTRACT: The eigenvalue equation

$$j^2\psi(jm) = j(j+1)\psi(jm), \qquad (1)$$

where j^2 is the operator for the square of the angular momentum will not change if the quantum number j can be changed as follows:

$$j \to j = -j-1. \qquad (2)$$

The Klebsch-Gordan coefficients which play an especially vital role in

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ACCESSION NR: AP4012963

mathematical devices for the vector addition of angular momentum are expressed by the ordinary sums of values consisting of the factorials of the linear combinations of the parameters of these coefficients. Since the permutation of (2) has the consequence that some of these linear parameter combinations become negative. The formulas for the Klebsch-Gordan coefficients have the interesting result that during the substitution of (2), the number of factorials from the negative values is identical in both the numerator and denominator. Hence, the following ratio can be effectively employed:

$$\frac{(-a)!}{(-b)!} = \frac{(-1)^{b-1}(b-1)!}{(-1)^{a-1}(a-1)!} = (-1)^{b-a}\frac{(b-1)!}{(a-1)!}.$$

This ratio is obtained by estimating the ratio limit between two Gaussian II functions when they approach their poles. The indexes a - 1 and b - 1 denote the number of negative factors. When substituting (2) for discrete parameters representing the angular momentum quantum numbers, the equations for the Klebsch-Gordan coefficients pass into each other or into themselves to within the phase factor. In addition to this, other forms of equations are obtained which have not been utilized up to the present. In such a case, an indeterminant

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factor ±1 appears, which makes these formulas awkward for the problem in question. From a practical point of view, the important case is when substitution of (2) is not carried out by all three parameters. The most important parameters are the Klebsch-Gordan coefficients with two negative parameters representing the angular momentum quantum number. The ratio $\begin{bmatrix} j_1 & j_2 & j \\ m_1 & m_2 & m \end{bmatrix} = (-1)^{j_1+m_1} \begin{bmatrix} j_1 & j_2 & j \\ m_1 & m_2 & m \end{bmatrix}$

can be used for calculating the Klebsch-Gordan coefficients for a given value of j_2. Then $\begin{bmatrix} j_1 & j_2 & j_1+k \\ m_1 & m_2 & m_1+m_2 \end{bmatrix} = (-1)^{j_1+m_1} \begin{bmatrix} j_1 & j_2 & j_1-k \\ m_1 & m_2 & m_1+m_2 \end{bmatrix}$;

where $j_2 \geq k \geq -j_2$. Equation (5) shows that the event $j = j_1 + k$ can be obtained from the event $j = j_1 - k$ by the permutation $j_1 - j$, which enables the formula tables for the Klebsch-Gordan coefficients to be reduced by almost one-half. Orig. art. has: 18 formulas.

APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001963310010-7"

ACCESSION NR: AP4012963

ASSOCIATION: Institut fiziki i matematiki, Akademii nauk LitSSR (Institute of Physics and Mathematics, Academy of Sciences, LitSSR); Vil'nyusskiy gosudarstvenny"y universitet im. V. Kapsukasa (Vilno State University)

SUBMITTED: 30Sep63 ATD PRESS: 3046 ENCL: 00

SUB CODE: MA, GP NO REF SOV: 002 OTHER: 003

Card 4/4

BANDZAYTIS, A.A. [Bandzaitis, A.]; VIZBARAYTE, Ya.I. [Vizbaraite, J.]; YUTSIS, A.P. [Jucys, A.]

Standard transformation matrices in the method of bonding seven sets of tensors. Trudy AN Lit. SSR Ser. B no.3:3-18 '62. (MIRA 18:3)

1. Institut fiziki i matematiki AN Litovskoy SSR i Vil'nyusskiy gosudarstvennyy universitet im. V. Kapsukasa.

L 22280-66 EWT(d)/T/EWP(1) IJP(c)

ACC NR: AR6005180 SOURCE CODE: UR/0058/65/000/009/B003/B003

SOURCE: Ref. zh. Fizika, Abs. 9B32

AUTHORS: Rumshas, P. D.; Matulis, V. A.; Yutsis, A. P. 47 B

TITLE: Study of 3nj coefficients with an electronic digital computer

REF SOURCE: Lit. fiz. sb., v. 4, no. 4, 1964, 447-455

TOPIC TAGS: quantum mechanics, matrix function, quantum number, computer application, digital computer/ BESM-2M digital computer

TRANSLATION: A method is proposed for studying the 3nj coefficients, based on all possible connections of any of 2n points to three other points in such a way as to make the resultant diagrams not cut by less than four lines. The corresponding program for computation with the BESM-2M digital computer is compiled. All 3nj coefficients specified by the arrangement of diagonals in a 14-side polygon, and classified in accordance with the polygon symmetries, are presented. The concept of the matrix of common lines between polygons is introduced and is used to present an additional characteristic for 18j and 21j coefficients.

SUB CODE: 20

Card 1/1 nst

L 22267-66 EWT(1)/EWP(1)/T IJP(c)

TOPIC TAGS: quantum theory, quantum number, mathematic operator, eigenvalue

TRANSLATION: The authors discuss the behavior of the quantities which are involved in the theory of the angular momentum under the transformation of the type (1). It is shown that this transformation is equivalent to a transition to a new system of coordinates, obtained by mirror reflection in the plane of the indeterminate components of the angular momentum. If $\psi(jm)$ is the eigenfunction of the operators of the square of the angular momentum and of the projection of the momentum on the z axis, then the transformation corresponding to the substitution (1) is $x' = x$, $y' = y$, ...

... symbols are presented.

SUB CODE: 20

Card 1/1

YUTSIS, A.P. [Jucis, A.]; KAROSENE, A.V. [Karosiene, A.]; ALISHAUSKAS, S.I. [Alisauskas, S.]

Symmetry of the mirror reflection in the case of an SU(3) group. Pis'. v red. Zhur. eksper. i teoret. fiz. 1 no.4: 17-21 My '65. (MIRA 18:11)

1. Vil'nyusskiy gosudarstvennyy universitet imeni Kapsukasa i Institut fiziki i matematiki AN Litovskoy SSR. Submitted April 10, 1965.

L 29611-66 EWT(1)/EWT(m)/EWP(t)/ETI IJP(c) JD
ACC NR: AT5012817 SOURCE CODE: UR/2910/65/005/001/0063/0069

AUTHOR: Rudzikas, Z. B.; Rudzikas. Z.; Vizbarayte, Ya. I.; Yutsis, A. P.; Vizbaraite, J.; Jucys, A. 49 B+1

ORG: Vilnius State University im. V. Kapsukas (Vil'nyusskiy Gosudarstvennyy universitet)

TITLE: Calculation of line strength in the spectrum of the neon atom 21

SOURCE: AN LitSSR. Litovskiy fizicheskiy sbornik, v. 5, no. 1, 1965, 63-69

TOPIC TAGS: line intensity, atomic spectrum, neon, electron transition, excited state

ABSTRACT: Line strength 21 is theoretically calculated for the case of transitions between excited states of the neutral neon atom. The calculations are based on the J_0l-bond in $2p^5nl$ configurations with the exception of the case where $nl=3s$ where the LS-bond is used in conjunction with the J_0l-bond. The LS-bond coincides with the LS_0-bond in the given case. Satisfactory agreement is observed between theoretical values of the total line strength for the $3d$-$4f$ transition and the experimental

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L 29611-66
ACC NR: AT5012817

relative intensities of the corresponding lines. Orig. art. has: 2 tables, 6 formulas.

SUB CODE: 20/ SUBM DATE: 04Apr64/ ORIG REF: 005/ OTH REF: 003

Card 2/2 CC

L 28000-66 EWT(1) IJP(c) CG SOURCE CODE: UR/2910/65/005/002/0171/0184

ACC NR: AT6012879

AUTHOR: Yutsis, A. P.--Jucys, A.; Savukinas, A. Yu.--Savukynas, A.; Bandzaytis, A. A.--Bandzaitis, A.

ORG: Vilnius State University im. V. Kapsukas (Vil'nyusskiy gosudarstvennyy universitet); Institute of Physics and Mathematics, AN Lithuanian SSR (Institut fiziki i matematiki AN Litovskoy SSR)

TITLE: Comments on the mirror reflection symmetry in the quantum mechanical angular momentum theory

SOURCE: AN LitSSR. Litovskiy fizicheskiy sbornik, v. 5, no. 2, 1965, 171-184

TOPIC TAGS: quantum number, light reflection, matrix function, coordinate system, quantum mechanics

ABSTRACT: The mirror reflection symmetry in the quantum mechanical angular momentum theory has been investigated. The reflection of the coordinate system and of the space in the plane of undefined components of the angular momentum was examined. It [illegible] that when in the normal [illegible] coordinate system, the angular [illegible]

tions of the angular momentum operator, and to the transformation of the standard

Card 1/2

L 28000-66

ACC NR: AT6012879

irreducible tensorial set to the contrastandard one in the more general case. It is concluded that in the case of Wigner coefficients and of transformation matrices of coupled angular momentum operator-proper functions, the space reflection is of no use. However, the reflection of the coordinate system is very useful. Orig. art. has: 6 figures and 6 formulas. [Based on authors' conclusion] [NT]

SUB CODE: 20/ SUBM DATE: 08Sep64/ ORIG REF: 003/ OTH REF: 004/

Card 2/2

L 44374-66 EWT(m)/T

ACC NR: AT6023218 SOURCE CODE: UR/2910/65/005/003/0315/0320

AUTHOR: Rudzikas, Z. B.--Rudzikas, Z.; Vizbarayte, Ya. I.--Vizbaraite, J.; Yutsis, A. P.--Jucys, A.

ORG: Institute of Physics and Mathematics of the Academy of Sciences of the Lithuanian SSR (Institut Fiziki i matematiki Akademii nauk Litovskoy SSR); V. Kapsukas State University Vilnius (Vil' nyusskiy Gosudarstvennyy universitet im. V. Kapsukasa)

TITLE: Further study of orbit-orbit interaction in atomic spectra

SOURCE: AN LitSSR. Litovskiy fizicheskiy sbornik. v. 5, no. 3, 1965, 315-320

TOPIC TAGS: atomic spectrum, orbit orbit interaction, ion interaction, electron interaction, electron mirror, matrix element, integral operator

ABSTRACT: The expressions are given for two-electron matrix elements of the orbit-orbit interaction energy operation in the configurations l,l' at $k=0$, 1, and 2.

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ACC NR: AT6023218

The coefficients of the radial integrals are expressed (by l') in terms of the orbital quantum number of one of the two electrons, the corresponding quantum number of the other electron being equal to 0, 1, and 2. A method of using mirror reflection symmetry for checking of the expressions is described. Some numerical values are determined for an orbit-orbit energy interaction of $CI2_p3_p$ and for the series of atoms and ions whose configurations are 2_p^n(N=2, 3, 4) and $3d^n$(N=2, 3, . . . , 8). Orig. art. has: 3 tables and 12 formulas.

[AM]

SUB CODE: 20/ SUBM DATE: 16Dec64/ ORIG REF: 008/ OTH REF: 006/

Card 2/2 hs

L 40855-66 EWT(1) AT

ACC NR: AT6023219 SOURCE CODE: UR/2910/65/005/003/0335/0339

AUTHOR: Eringis, K. K. -- Eringis, K.; Yutsis, A. P. -- Jucys, A.

ORG: Institute of Physics and Mathematics, Academy of Sciences Lithuanian SSR (Institut fiziki i matematiki Akademii nauk Litovskoy SSR); Vil'nyus State University im. V. Kapsukas (Vil'nyusskiy Gosudarstvennyy universitet)

TITLE: Expanded method of calculation for isoelectronic atoms and ions with two 1s-electrons and an almost filled shell of 2p-electrons

SOURCE: AN LitSSR. Litovskiy fizicheskiy sbornik. v. 5, no. 3. 1965, 335-339

TOPIC TAGS: electron shell, wave function, nuclear shell model, electron energy level

ABSTRACT: The results of calculations with the use of an expanded method of calculating for isoelectronic sequences of atoms and ions having configurations $1s^2 2p^N$ (N = 4, 5, 6) are given. The analytical radial one-electron wave functions with Hartree values of the parameters are used. The results obtained are compared with the results of the usual method of calculation. The calculations were performed on an electronic computer. It was found that with an increase of the nuclear charge in the isoelectronic sequence, the energy correction for the expanded method of calculation changes negligibly. Thus, in the isoelectronic sequence of carbon the

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correction with respect to absolute value is 0.158 atomic units for term ^3P of the carbon atom and 0.165 au for fluorine. In the isoelectronic sequence of nitrogen the correction for nitrogen is 0.302 and for neon 0.304 au. The energy correction for the expanded method of calculation increases more rapidly than the number of equivalent 2p-electrons of an atom. Despite the rather wide dispersion of probabilities with respect to individual radial functions, the overall radial distribution of probability differs negligibly from the corresponding distribution in the usual method of calculation. The general tendency is that, in the expanded method of calculation the radial distribution of the probability of finding an electron close to the nucleus, in comparison with the usual method of calculation, is an obvious fact if the decrease of the energy values in comparison with the usual method of calculation is taken into account. Orig. art. has: 1 table and 1 figure.

SUB CODE: 18/ SUBM DATE: 31Dec64/ ORIG REF: 001/ OTH REF: 002

ACC NR: AF7003642 SOURCE CODE: UR/0020/67/172/001/0058/0060

AUTHOR: Alishauskas, S. I.; Rudzikas, Z. B.; Yutsis, A. P. (Academician AN LitSSR)

ORG: Institute of Physics and Mathematics, Academy of Sciences, LitSSR (Institut fiziki i matematiki Akademii nauk LitSSR); Vilnius State University im. W. Kapsukas (Vil'nyusskiy gosudarstvennyy universitet)

TITLE: Substition groups of the representations of the G_2 and SU_3 groups

SOURCE: AN SSSR. Doklady, v. 172, no. 1, 1967, 58-60

TOPIC TAGS: group theory, Lie group, shell theory, elementary particle, strong nuclear interaction

ABSTRACT: In view of the importance of groups G_2 and SU_3 for the theory of electron shells of atoms and for the theory of elementary particles, the authors discuss substitions of the parameters of representations which leave the characters of these groups invariant. Use is made of earlier work by the authors (Pis'ma ZhETF v. 1, no. 4, 17, 1965), dealing with similar substitutions for the SU_2 group and one case of substitution for SU_3. It is shown in this paper that such substitutions make up a group which is characteristic of the given Lie group and is isomorphic to the reflection group. This is done by finding substitutions for those parameters which leave invariant the eigenvalues of the Casimir operators. A list of substitutions under which the groups remain invariant is presented. Interpretations are presented for a number of the substitutions. The result can be useful in treatment of rela-

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UDC: 530.1(018) + 530.1: 113

ACC NR: AP7003642

tions between particles and antiparticles. In general, advantage of their practical utility can be taken only in concrete calculations. Orig. art. has: 5 formulas.

SUB CODE: 20, 12/ SUBM DATE: 26Sep66/ ORIG REF: 002/ OTH REF: 004

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ADAMOVICH, L.P.; YUTSIS, B.V.

Photometric determination of beryllium in iron alloys. Ukr.khim. zhur. 23 no.6:784-787 '57. (MIRA 11:1)

1.Khar'kovskiy gosudarstvennyy universitet im. A.M. Gor'kogo.
(Beryllium) (Iron alloys)

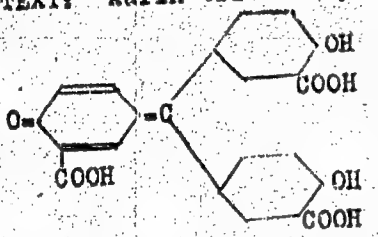
S/079/60/030/04/63/080
B001/B011

AUTHORS: Adamovich, L. P., Timofeyeva, I. I., Yutsis, B. V.

TITLE: Aurin Tricarboxylic Acid and Its Reaction With Beryllium Salts

PERIODICAL: Zhurnal obshchey khimii, 1960, Vol. 30, No. 4, pp. 1325-1334

TEXT: Aurin tricarboxylic acid



had been first suggested as an analytic reagent in 1925 (Ref. 1). It is simply synthesized (Ref. 2) from easily available compounds, and is fairly often used in the form of ammonium salt, under the name of "Aluminon", as a reagent on

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aluminum (Ref. 3), some rare elements (Ref. 4), beryllium (Ref. 5), et al. Nonetheless, this acid in itself, as well as its reaction with metals, is insufficiently investigated (Refs. 6-9). A. Babko (Ref. 7) suggested a composition of the aluminum complex 1 : 1 formed, according to his diagram (this composition was confirmed by L. Molot, L. Kul'berg (Ref. 8)) without giving the lability constant. Recently, L. Serdyuk and collaborators (Ref. 9) reported on the presence of two beryllium-aluminum complexes with the composition 1 : 1 (at pH 5) and 3 : 1 (at pH 7). No demonstration was given, nor data concerning the properties of the reagent. This problem therefore requires an investigation to be made, first of all, on the acid itself. The authors studied the behavior of the acid in the pH-range 4-14, and calculated the constants of acid dissociation, as well as the coefficients of the molar light absorption at $\lambda 520$ mμ for the anions. Mention is made of the weakening of coloration of fresh alkali solutions of the dye in the course of time. In the pH-range 4-6, the formation of only one complex with the acid in the ratio 1 : 1 is observed in a fairly wide range of beryllium concentrations. The structure of this complex was defined. In the pH-range 13-14 a reaction of beryllium with the dye is likewise observed; this process was not investigated further. The complex arising in the acid region can be made use of for objective photometric de-

Aurin Tricarboxylic Acid and Its Reaction With Beryllium Salts

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terminations at pH 4.3, as well as for visual ones at pH 6-7. Papers by I. S. Ioffe (Ref.11) and N. P. Komar' (Ref. 14) are also mentioned. There are 5 figures, 3 tables, and 20 references, 11 of which are Soviet.

ASSOCIATION: Khar'kovskiy gosudarstvennyy universitet (Khar'kov State University)

SUBMITTED: March 12, 1959

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ADAMOVICH, L.P.; YUTSIS, B.V.

Colorimetric determination of beryllium in bronze with aluminon.
Zav.lab. 28 no.8:920-921 '62. (MIRA 15:11)

1. Khar'kovskiy gosudarstvennyy universitet imeni A.M.Gor'kogo.
(Beryllium—Analysis) (Aluminon) (Bronze—Analysis)

ACCESSION NR: AR4033706 S/0081/64/000/003/G023/G023

SOURCE: Referativnyy zhurnal. Khimiya, Abs. 3G142

AUTHOR: Adamovich, L. P.; Yutsis, B. V.

TITLE: Detection and determination of beryllium in alloys by means of aurin tricarboxylic acid

CITED SOURCE: Uch. zap. Khar'kovsk. un-t, v. 133, 1963, Tr. Khim. fak. i N.-i. in-ta khimii KhGU, v. 19, 135-139

TOPIC TAGS: beryllium, beryllium determination, alloy analysis, aurin tricarboxylic acid, aluminon

ABSTRACT: Methods have been developed for the detection of Be in Cu-, Al- and Fe alloys and the photometric determination of Be in Cu alloys with aluminon (I). To detect Be in Cu alloys, 0.05 g of the sample are dissolved in 10 ml HNO_3 (1:3). An excess of 5% $(NH_4)_2CO_3$ solution is added to 1 ml of the solution obtained, 1.5 g KU-1 cation exchange resin in the NH_4-form is introduced and the mixture is shaken for ~1 hr. (until the solution becomes decolorized). Three ml of the colorless solution containing 1 drop phenolphthalein are neutralized with 0.1 N HCl until the solution is slightly pink, after which 3 ml of a solution of I are added. The solu-

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ACCESSION NR: AR4033706

tion of I is prepared by dissolving 0.0844 g aurin tricarboxylic acid in 53 ml 0.1 N NH_4OH and adding 47 ml 0.1 N CH_3COOH and 100 ml 1% complexon III solution at pH 8.4. In the presence of Be the solution turns pink after adding I. To detect Be in Al- and Fe alloys, 0.5 g of the sample are dissolved in 20 ml HCl (1:1), several drops of concentrated HNO_3 are added and the mixture is boiled for 3 min. The solution is neutralized with concentrated NH_4OH, 10 ml 5% oxalic acid and 4 g KU-1 cation exchange resin in the H-form are added and the mixture is shaken for ~1 hr. The solution (containing the Al) above the resin is decanted, the resin is washed with water to a neutral reaction, and Be is extracted by shaking (~1 hr.) with 15 ml 10% HCl. The extraction of Be with acid is repeated once more, both solutions are combined, evaporated to 2-3 ml, neutralized to pH 8 and, after adding a solution of I, heated for 1-2 min. A pink color appears in the presence of Be. For the quantitative determination of Be in Cu alloys, 0.1 g of the sample (with a 0.3-3% Be content) is dissolved in HNO_3 (1:5) and the solution is diluted to 100 ml. Concentrated NH_4OH is added to 10 ml of the solution (until slight turbidity is formed which is eliminated by adding HNO_3), and the resulting solution is diluted with water to 100 ml. An aliquot of this solution is combined with an equal volume of the reagent solution. To prepare it, 1.25 g complexon III and 0.1055 g aurin tricarboxylic acid are dissolved in 100 ml of a buffer solution (3 parts of 0.1 N CH_3COOH and 1 part of 0.1 N NH_4OH) and diluted to 250 ml with the same buffer solution. The mixture of the solution to be analyzed and the reagent solution is heated for 5 min. on a

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ACCESSION NR: AR4033706

steam bath and read, after cooling, in a FEK-M photoelectric colorimeter with a green filter in a 1 cm cuvette, using a control test solution as the reference solution. The error in the determination of Be is 1.52%. L. Sin'kova

DATE ACQ: 02Apr64 SUB CODE: CH, ML ENCL: 00

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ZHVIRONAYTE, S.A. [Zvironaite, S.]; VIZBARAYTE, Ya.I. [Vizbaraite, J.]
YUTSIS, A.P. [Jucys, A.], akademik

Calculation of matrix elements of the energy operator in the case of one electron outside the quasi-closed shell. Trudy AN Lit. SSR. Ser. B no.1:3-15 '62 (MIRA 17:8)

1. Institut fiziki i matematiki AN Litovskoy SSR i Vil'nyusskiy gosudarstvennyy universitet im. V.Kapsukasa. 2. Zamestitel' glavnogo redaktora zhurnala "Trudy AN Litovskoy SSR; serija "B" (for Yatsis).

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1. Nachal'nik Primorskoy stantsii zashchity rasteniy, Vladivostok (for Vavilov). 2. Nachal'nik Brestskoy stantsii zashchity rasteniy (for Ushakov). 3. Glavnyy agronom Brestskoy stantsii zashchity rasteniy (for Derkach). 4. Nachal'nik Pskovskoy stantsii zashchity rasteniy (for Akol'zin). 5. Mogilevskiy otryad po zashchite rasteniy (for Yutsov). 6. Nachal'nik Gomel'skoy stantsii zashchity rasteniy (for Yevmenenko).

BELKIN, L.I.; GORELOV, L.R.; GORYACHIY, Ya.V.; ZILOV, A.L.; NEMTSOV, Yu.M.; TAPINSKIY, V.N.; YUTT, Ye.M.; ANDRONOV, A.F., inzh., red.

[Automobile "Moskvich" 403; design and maintenance] Avtomobil' "Moskvich" modeli 403; konstruktsiia i tekhnicheskoe obsluzhivanie. Moskva, Mashinostroenie, 1965. 402 p. (MIRA 18:8)

1. Glavnyy konstruktor Moskovskogo zavoda malolitrazhnykh avtomobiley (for Andronov).

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1. Otdel zoologii i parazitologii AN BSSR. Predstavleno akademikom AN BSSR D.A. Markovym.

BELKIN, Leonid Isaakovich; GORYACHIY, Yakov Vladimirovich; NOVOSELOV, Igor' Vasil'yevich; YUTT, Yevgeniy Markovich; ANDRONOV, A.F., inzh., red.; VASIL'YEVA, I.A., red. izd-va; UVAROVA, A.F., tekhn. red.

[The "Moskvich-407" automobile; design and maintenance] Avtomobil' "Moskvich" modeli 407; konstruktsiia i tekhnicheskoe obsluzhivanie. Pod red. A.F.Andronova. Moskva, Gos.nauchno-tekhn. izd-vo mashinostroit.lit-ry, 1961. 398 p. (MIRA 14:6)

1. Glavnyy konstruktor Moskovskogo zavoda malolitrazhnykh avtomobiley (for Andronov)

(Automobiles)

YUVACHEVA, N.Ya.; LIPOVSKAYA, T.N.; AVERBUKH, N.M., inzh., red.; YELAGINA, T.A., tekhn.red.

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(ESOPHAGUS, stenosis
caustic & cicatricial strictures, ther. (Rus))

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(Motor sledges)

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(Canoes and canoeing)